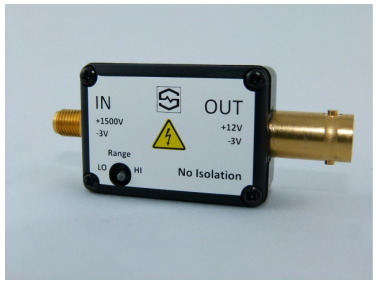
Springburo

CLIPPER
TEST PROBE

Operating Instructions

Version: 1.4



Note: Changes from version 1.3:
Kit contains now 3.5 and 5mm BNC Adapters (for direct Oscilloscope probe attachment). Ref Page 4 & 5. Applicable for shipment dates from 1st Januar 2015.

CE

EC Declaration of Conformity

The product is marked with this symbol to indicate that it conforms to the applicable European Union requirements per Low Voltage Directive LVD 2006/95/EC. Compliance was demonstrated to the following specification as listed in the Official journal of the European Communities.

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for handheld probe assemblies for electrical measurement and test.

EU RoHS Compliance

The Probes and it's accessories conform to the 2011/65/EU RoHS2 Directive, as they have been classified as Industrial Monitoring and Control Equipment (per Article 3, Paragraph 24).

General Safety Information

Observe generally accepted safety procedures in addition to those listed here to avoid personal injury or damage to equipment. **The overall safety of any system incorporating the Clipper Test Probe is the responsibility of the person using the system.**

Because of its application area (the measurement of high voltages), it is particularly important to read the connection instructions and safety instructions listed below.

Connect & Disconnect Properly:

The Clipper Test Probe has an “IN” and an “OUT” connection. The “IN” is to be connected across the Vds or the Vce of the DUT (Device Under Test). The “OUT” terminal is to be connected to an Oscilloscope using a 10X Probe. Connections must only be made when the DUT is switched off, and it is certain that no residual charge (eg in capacitors) remains. Further instructions follow.

High Voltage Warning:

The Clipper Test Probe is designed to measure max continuous voltages of 1500V DC. Do not apply any voltage to the probe greater than the Absolute Maximum Rating (1700V). Before switching on the device under test, make sure there is no part of the body within 30cm of the test area. Do not leave the test area switched on and left unattended, switch off immediately after making the tests.

Negative Voltage Warning:

The Clipper Test Probe is designed to “clip” positive voltages only. It can withstand negative voltages not exceeding -5V. Any DC Voltage less than this could permanently damage the device. Therefore it is essential to take care when connecting the inner “Positive” terminal to the “Drain” or “Collector” of the DUT.

Grounding and Isolation:

The Clipper is a passive test probe, with no isolation between IN and OUT. Under normal conditions, no voltages above 15VDC appear on the output terminals, but be aware that under fault conditions it may be possible to have the IN voltages present on the OUT and the Probe must be handled with this consideration. ALWAYS keep a safe distance between the DUT and the IN / OUT terminals before powering on the DUT. Under **NO** circumstances touch the Clipper OUT terminal when the Test is live.

Environment:

The Clipper is designed for Laboratory use only. Do not use in wet or explosive atmosphere.

Cleaning:

Do not immerse the unit in water. Use a soft moist cloth to clean surfaces. The probe must be completely dry before use

OPERATION

Functional Description:

The Clipper Test Probe allows the measurement of low voltage signals (below 12V) in the presence of high voltages (up to 1500VDC). Without the Clipper, the Oscilloscope must either but switched into a high-range (say 100V/Div) with corresponding low resolution, or can be put into a low-range (say 2V/DIv) with input buffer overload effects and offsets being generated by the overdriven Oscilloscope input amplifiers.

The Transfer function can be written as:

If Vin >= 2V (LO Range)
    V(out) = 2V
Else
    V(out) = V(in)

If Vin >= 12V (HI Range)
    V(out) = 12V
Else
    V(out) = V(in)

No signal conditioning of the input signal is performed. Measurement accuracy of the input signal is >98%. Settling time is around 100nS.

Applications

The Clipper is perfect for observing the Rds(on) of a switched FET, or IGBT. With an Oscilloscope set to 200mV /division, the stability of Rds(on) over a range of say 200mΩ to 1Ω can be clearly seen in good resolution, while the power transistor is switching.

More details and full specifications and application help can be found on our Website: **www.springburo.weebly.com**

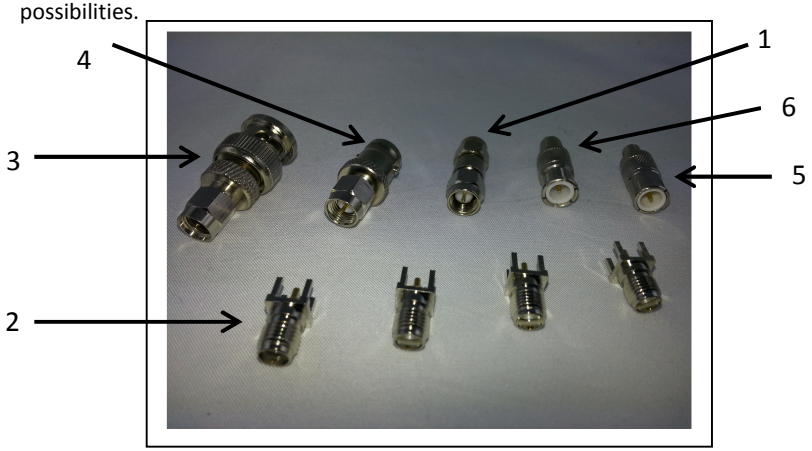
Contents of Packing

The Clipper and accessories are delivered in an Aluminium case as shown in Fig 1:

Accessory List (ref Fig 2):

Pos	Type	Spec	Qty
1	SMA to SMA Male	12GHz, 50Ω	1
2	SMA BU P	50Ω	4
3	SMA BNC Plug	50Ω	1
4	SMA BNC Socket	50Ω	1
5	BNC Adapter 3,5mm, CT3655	50Ω	1
6	BNC Adapter 5mm	50Ω	1

Fig 2: The accessories are provided to allow different connection possibilities.



Operating Details

Overview

The Clipper is operated as follows:
Firstly, make sure DUT is switched OFF !!

INPUT:
1: Connect Solder terminals to SMA
2: Solder +/- connections to DUT
3: Screw SMA onto Clipper using SMA to SMA adapter

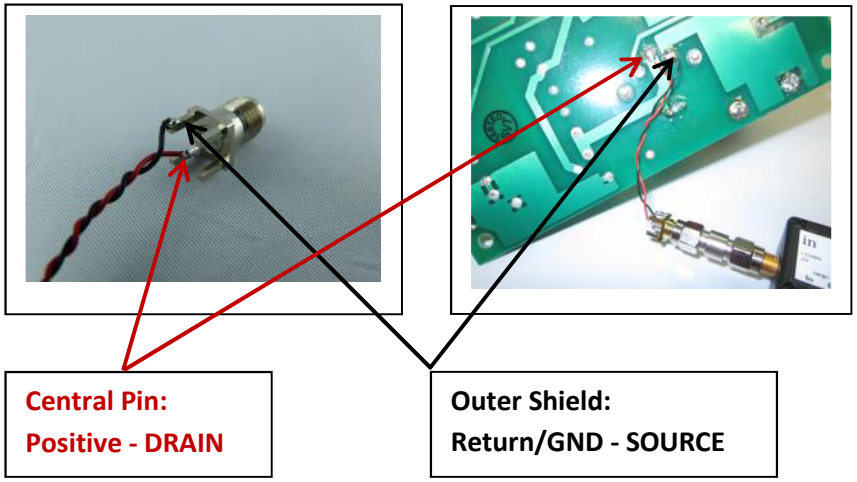
OUTPUT:
4: Connect 10X scope probe to BNC terminal of Clipper
5: Set Range switch to either HI (12V) or LO(2V).
6: Adjust Oscilloscope to correct sensitivity (e.g. 200mV or 2V/Div) depending on Range setting.
7: If using current probe, set Oscilloscope channel accordingly, and use MATH function to display Rds(on) = Vds/Ids
8: Switch on DUT and observe Rds(on)

INPUT

Using adapter Nr 2, a small twisted pair can be connected as shown in Fig3 below.

The RED wire is positive, and must be connected to the more positive voltage (usually the DRAIN or COLLECTOR) of the transistor being tested, and to the centre pin of the SMA Plug. The Black wire is the negative (or Ground) return, and must be connected to the SOURCE or EMITTER, and to the outer screen of the SMA Plug. (ref Fig 4 for circuit diagram):

Fig 3: Connection details for INPUT terminal



Note: Keep the connection wires as short as possible to minimise inductive effects such as ringing.

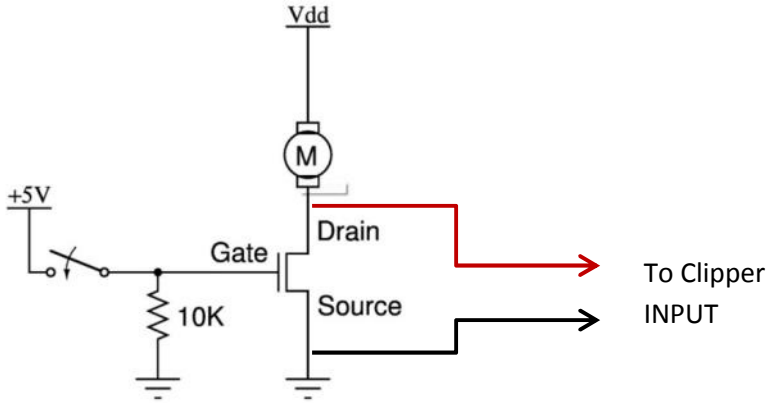


Fig 4: Electrical Diagram showing typical connection schematic.

Notes:

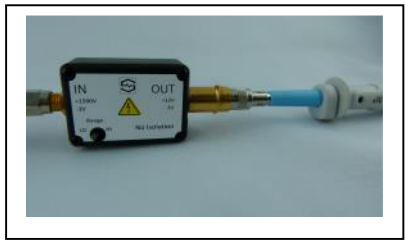
- Inclusion of a sense resistor in the circuit will reduce the accuracy of the Clipper. Measurements must be made across the DRAIN & SOURCE directly for best results.
- Current drawn by the clipper is a constant 350µA, independent of Input Voltage.
- Keep connections short and twisted for best possible frequency response.

OUTPUT

The Output terminal of the CLIPPER is designed to connect directly to an Oscilloscope probe (using a BNC adapter: See Fig 2 Pos 5 or Pos 6) . It is recommended to use a 10X high impedance probe. This is because as the Clipper is a passive device (no external power supply required) there is no active impedance buffering in the device. To protect the device, a series 300Ω resistor is included, so when using a 50Ω connection, there will be an

error in voltages measured, caused by the potential divider effect. With a high impedance probe, this effect is negligible.

A typical OUTPUT connection looks like this:



MODE SWITCH

Range Switch

The Range switch sets the actual clipping voltage.

LO Range: Maximum Output Voltage 2V (nominal)

HI Range: Maximum Output Voltage 12V (nominal)

Load current is not affected,

Repairs / Service / Calibration

For high voltage protection, the internal electronics is sealed with a potting compound. There are no user serviceable parts inside, no repairs are possible.

Because of the unique “pass-through” design, there is no need to calibrate the device.

IP Protection:

The Clipper design and intellectual property is protected with an International Patent (pending at time of writing, July 2014).

Recycling:

The Clipper can be recycled with the normal electronic recycling systems. There are no hazardous materials included (such as batteries or Lead). Springburo GmbH is registered with the ear-stiftung in Germany, which regulates the recycling of consumer and Industry electronic products.

Registration Number: **DE 77429530**

DISTRIBUTORS

The product is supported by trained field technicians in the following regions:

Germany:
ADMESS Elektronik GmbH
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www.admess.de

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